



Standard Test Method for Lightweight Particles in Aggregate¹

This standard is issued under the fixed designation C123/C123M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method covers the determination of the percentage of lightweight particles in aggregate by means of sink-float separation in a heavy liquid of suitable specific gravity.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard. Some values have only SI units because the inch-pound equivalents are not used in the practice.

NOTE 1—Sieve size is identified by its standard designation in Specification E11. The alternative designation given in parentheses is for information only and does not represent a different standard sieve size.

1.3 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For a specific hazard statement, see 6.1.4.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- C33 Specification for Concrete Aggregates
- C125 Terminology Relating to Concrete and Concrete Aggregates
- C127 Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
- C128 Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate
- C702 Practice for Reducing Samples of Aggregate to Testing Size
- C1005 Specification for Reference Masses and Devices for Determining Mass and Volume for Use in Physical Testing of Hydraulic Cements
- D75 Practice for Sampling Aggregates
- D3665 Practice for Random Sampling of Construction Materials
- E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves
- E100 Specification for ASTM Hydrometers

3. Terminology

3.1 For definitions of terms used in this test method, refer to Terminology C125.

4. Significance and Use

4.1 This test method is used to determine conformance with provisions of Specification C33 pertaining to the amount of lightweight material in fine and coarse aggregates. A heavy liquid with a specific gravity of 2.0 is used to separate particles which may be classified as coal or lignite. Heavier liquids are to be used to check the percentages of other lightweight particles such as chert and shale having a specific gravity less than 2.40.

4.2 The test method is useful in identifying porous aggregate particles in research activities or in petrographic analyses.

¹ This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.20 on Aggregates.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.



8.1.3 Normally the discrepancy between oven-dry mass and saturated-surface-dry mass of the decanted particles will not significantly affect the calculated percentage of light-weight particles.

8.2 **Coarse Aggregate**—Allow the dried test specimen of coarse aggregate to cool to room temperature and sieve over a 4.75 mm (No. 4) sieve. Determine the mass of the material coarser than the 4.75 mm (No. 4) sieve to the nearest 1 g, and bring to a saturated-surface-dry condition by means of the procedure specified in Test Method C127; then introduce it into the heavy liquid in a suitable container. The volume of liquid shall be at least three times the absolute volume of the aggregate. Using the skimmer, remove the particles that float to the surface, and save them. Repeatedly agitate the remaining particles, and remove the floating particles until no additional particles rise to the surface. Wash the particles which are skimmed off in an appropriate solvent to remove the heavy liquid (see 8.1). After the heavy liquid has been removed, allow the particles to dry (see 8.1.2). Determine the mass of the decanted particles to the nearest 1 g. If a more precise determination is required, dry the particles to constant mass at $110^{\circ}\text{C} \pm 5^{\circ}\text{C}$ [$230^{\circ}\text{F} \pm 10^{\circ}\text{F}$] to determine the value of W_1 used for the calculation in 9.1 (see 8.1.3).

9. Calculation

9.1 Calculate the percentage by mass of lightweight particles (particles floating on the heavy liquid) as follows:

For fine aggregate:

$$L = (W_1/W_2) \times 100 \quad (1)$$

For coarse aggregate:

$$L = (W_1/W_3) \times 100 \quad (2)$$

where:

L = percentage by mass of lightweight particles,

W_1 = dry mass of particles that float,

W_2 = dry mass of portion of specimen coarser than 300 μm (No. 50) sieve, and

W_3 = dry mass of portion of specimen coarser than the 4.75 mm (No. 4) sieve.

10. Report

10.1 Report the following information:

10.1.1 Identification of the aggregate as to source, type and nominal maximum size,

10.1.2 The mass of the test sample used,

10.1.3 Type and specific gravity of heavy liquid used for the test, and

10.1.4 Percentage by mass of lightweight particles rounded to nearest 0.1 %.

11. Precision and Bias

11.1 **Precision**—No interlaboratory or intralaboratory studies have been conducted using this test method to determine precision indices. The committee is seeking pertinent data from users of the test method.

11.2 **Bias**—Bias of the test method may be estimated by running separate specific gravity and absorption determinations on individual particles of the separate sink, or float fractions, or both.

12. Keywords

12.1 aggregate; heavy liquid; lightweight particles

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